AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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PRECARIOUS EXISTENCE

Between 1929 and 1959, according to a recent report by the Department of Agriculture, there has been an increase of 1.2 pounds in the per capita consumption of food fats in the United States.[1] Since consumption in 1929 was 44.9 pounds, the 1959 total represents a net gain of less than three per cent — hardly a startling change over a 30-year period.

To the casual reader who does not look beyond the total, this would indicate that it must be a fairly easy task to satisfy the American consumer. His tastes haven't changed much. But a look behind the total tells an entirely different story. What the total consumption does not reveal are the drastic changes in consumer tastes in the various categories of food fats. The USDA study shows "major shifts in the use of food fats and oils have occurred over the past 30 years, even though per capita consumption has been relatively stable."

Substitution, says the Department, "has been continually taking place, both among the three major food fat groups — table spreads, cooking fats, and salad oils — as well as among products within each group." For example, consumption of butter is down about 55 per cent, whereas margarine is up 90 per cent. Shortening use increased 27 per cent, but lard dropped 29 per cent. Salad and cooking oils practically doubled per capita consumption. The 30-year period was characterized by almost constant shifts. Lard usage, for one, was 12.7 pounds in 1929, rose to 14.4 pounds in 1932, declined thereafter, only to bounce back to 14.4 in 1940. The postwar peak was 12.7 pounds in 1948, dropping to 9.0 pounds in 1959.

By now, it must be clear that far from having an easy time of it, growers, processors, and sellers had to engage in fancy footwork to meet the shifting tastes and demands of consumers. To a perfect stranger looking at the American market, that would probably be the most vivid impression: The consumer runs the show. He runs the show for the farmer with annual sales of $2,000, for the corner barbershop, and for the Du Pont Company whose sales this year will probably exceed $2 billion.

Because of the rapid rate of new developments, the chemical industry is perhaps forced to undergo the most rapid product changes of any major industry in this country. To meet the constant flux in consumer demands, a company like Du Pont spends $90 million annually in research and development. About half of Company sales in recent years have consisted of products resulting from Du Pont research and first introduced in the past 25 years.

And, the size of an enterprise is no guarantee that it will be able to meet the challenge of changing consumer decisions. Some years ago, a Brookings Institution study found that of the 100 largest industrial firms in 1909, only 38 were still on the 100-largest list in 1948.[2] The conclusion reached: "Industrial leadership at the big business level is precarious."

As long as the consumer is boss, it's going to be precarious at all levels.

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[1] *USDA: "Substitution Highlights the Food Fat and Oil Picture,"* Agricultural Situation, *44:4, p. 8, April, 1960.*

[2] *A. D. H. KAPLAN:* Big Enterprise in a Competitive System, *The Brookings Institution, Washington, 1954.*

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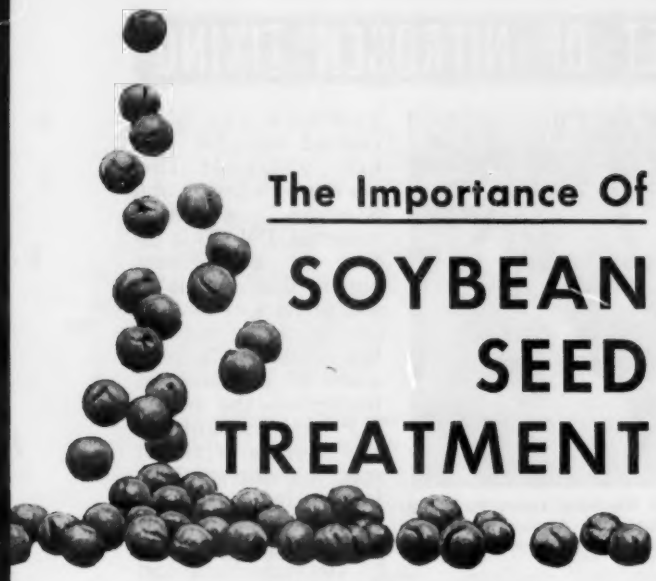

The Importance Of SOYBEAN SEED TREATMENT

By T. C. RYKER, Ph.D.
Industrial & Biochemicals Department
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Soybean seed is more sensitive to physical, microbial, and environmental damage than most of the crop seeds grown. This increases the danger of deterioration, making essential protective measures to assure a vigorous crop and good yield. The most important protective step is seed treatment, which not only provides an effective barrier to diseases under normal conditions, but becomes important where the seed is "weakened" by physical factors.

Deterioration of soybean seed is principally the result of:

1. **Aging.** Maximum seed vigor is attained at maturity. Thereafter, degeneration is caused by temperature and moisture. Changes in these factors, such as occur in the field before harvest, may produce stresses that cause internal injuries. Thus, moisture and temperature, rather than time, are the major influence in "aging."

2. **Mechanical Injury.** Mechanical bruising and fracturing also promote seed deterioration. Seed moisture has an important bearing on injury in processing. Greatest resistance to damage exists at moistures from 13 to 17 per cent, and highest susceptibility at low moisture. Thus, low moisture best for storage is not optimum for seed handling.

3. **Weather and Climate.** Exposure of seed to unfavorable climate or weather also promotes infection with microorganisms. The infection may be due to disease organisms, such as those causing purple stain, or the many common mold fungi that overgrow seed and become noticeable in germination tests. Physical damage, such as skin breaks, renders seeds more susceptible to invasion by disease-producing microorganisms.

Since many factors affect seed deterioration, it is evident that the type of injury may vary with season and crop area. For example, mechanical injury is the principal cause in the Midwest because of low moisture at harvest time. In the West and South, disease is the top problem.

Regional Problems

These regional variations also account for differences in acceptance of seed treatment. Where infection is prevalent, treatment is common, but it has not been generally recommended by investigators in the Midwest, except when germination is low.

A number of considerations indicate advisability of seed treatment wherever soybeans are grown. Foremost is that it makes a substantial contribution to stands, which is more important to the grower than germination. Seed deterioration may occur after germination. Treated seeds also promote a thick vigorous crop, thereby suppressing weeds. In any event, treatment is low-cost insurance, averaging only seven to 10 cents per bushel.

Protection Against Invasion

"Arasan" thiram seed disinfectants are available for dust or slurry treatment of soybean seed. The active ingredient, tetramethylthiuramdisulfide, is effective for control of disease organisms and fungi. Thiram will not, of course, restore the vigor of seed affected by physical injury, but it does provide protection against the invasion of organisms.

There has been no difficulty in using both fungicide and legume inoculums, provided that "Arasan" is used first and the inoculum at planting time. Recently, pre-inoculum seed treatment has come into use, but use of both fungicide and inoculum has not been worked out.

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Du Pont Scientists Find SECRET OF NITROGEN FIXING

A scientific breakthrough that opens the door to understanding a major life process has been achieved in the Du Pont Company's fundamental research work. Researchers have duplicated in a test tube the reaction nature uses within a living cell to create the nitrogen compounds without which life cannot exist. They have discovered a technique, long sought by scientists, by which nitrogen-fixing chemicals can be separated from bacteria and stimulated to perform their job outside the bacterial cell.

DU PONT scientists who developed laboratory system for fixing nitrogen with enzyme: (Left to right) Drs. Leonard E. Mortenson, James E. Carnahan, John E. Castle, and Howard F. Mower.

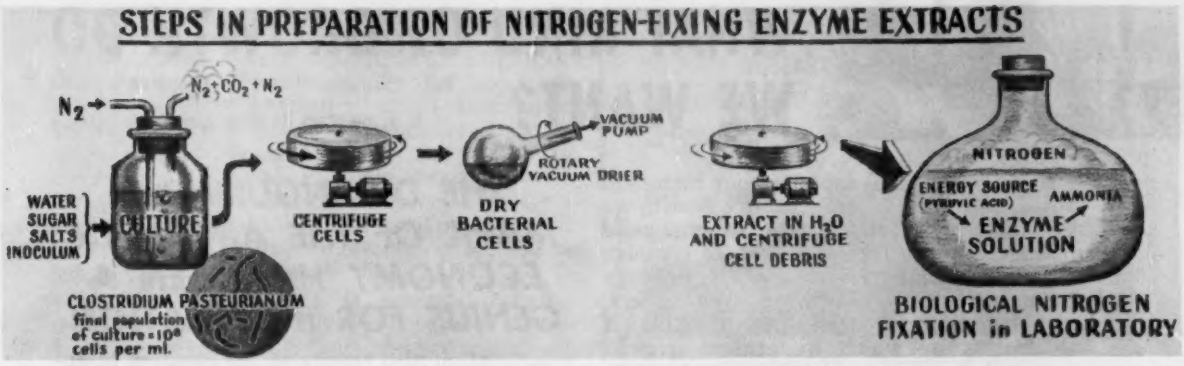
Huge quantities of nitrogen are available in the atmosphere, but can be used only by certain low forms of life. The process itself has, however, remained a nagging mystery. Scientists have agreed that isolating the chemicals that perform this operation from the living organism would be the key to the mystery.

Full understanding of this vital biological process is expected to answer many significant questions about the chemistry used by nature. It could also lead to greater farming efficiency and to increased food supplies in undernourished areas.

Research on nitrogen fixation in microorganisms has been carried out for several years at the Du Pont Experimental Station near Wilmington, Del. This effort to learn more about the chemistry and physics of biological processes typifies the Company's program of fundamental research — the search for basic scientific knowledge without specific commercial objective. Inaugurated in 1927, the program now engages approximately 400 scientists and costs about $14.5 million a year.

The earth's supply of fixed nitrogen must be constantly renewed since it eventually returns to the atmosphere. Some comes from mineral nitrate deposits, some is manufactured, some is created in the atmosphere by lightning. These sources are, however, secondary and inadequate. For instance, industry produces about 10 million tons of fixed nitrogen annually for fertilizer, but this is only two per cent of the nitrogen needed by the world's fertilized crops. Most fixed nitrogen used by plants is produced by bacteria and algae, either independently or in association with plants like peas and clover. These organisms carry out reactions which chemists today can match only

ROW OF CULTURE tubes connected to a nitrogen source (left) is used to store inoculum of Clostridium Pasteurianum for laboratory nitrogen-fixing process. Cultures used for extraction of enzyme are grown in large carboys on laboratory floor. "Paste" of bacteria (center) is obtained by centrifuging of culture. Rotating vacuum driers (right) prepare cells for enzyme extraction.



in complex industrial equipment, using extremes of heat and pressure.

Since the middle of the 19th century, scientists have been studying nature's method of fixing nitrogen. They have generally agreed that it is performed by enzymes. Detailed study has been blocked because researchers could not extract enzymes from living cells without destroying them. The Du Pont research men overcame this barrier. First, the living cells of selected bacteria are broken open and the enzymes extracted under precisely controlled conditions to avoid damaging the delicate enzyme system. Second, a chemical fuel — pyruvic acid — is used to provide the necessary energy for the nitrogen-fixing reaction. Extracted enzymes then carry out the process outside the bacterial cell.

Biological nitrogen fixation can thus be observed in detail and should enable scientists to analyze the enzyme chemistry within the living cell. When the bacterial processes are understood, it may be possible to duplicate them economically or stimulate them artificially to increase farming efficiency. This knowledge may also advance the study of catalytic reactions in general, because enzyme activity far surpasses man's accomplishments in this kind of chemistry.

The Du Pont researchers also confirmed previous theories that the end product of the bacterial fixation process is ammonia. The experiments were facilitated by using "heavy" nitrogen, a rare form of the gas, in a technique developed by Professors R. N. Burris and P. W. Wilson of the University of Wisconsin.

WEED CONTROL IN APPLE AND PEAR ORCHARDS

Weeds around apple and pear trees have always been a problem, since they compete heavily for moisture, soil nutrients, and even for sunlight if the weeds get tall enough. Weeds at the base of trees may provide shelters for mice, which injure young trees by feeding on the bark in winter.

These problems are eliminated by control of weeds under the trees. Growers in many parts of the country have also become interested in weed control on the entire orchard floor. Such extended control has, for example, become common to the clean-culture, non-cultivation programs of California citrus growers. This has provided such advantages as reduced maintenance costs, better water penetration, improved soil structure, and, of course, elimination of competition from weeds.

With the recent rapid progress in the development of herbicides, many tests have been conducted on the effectiveness of these chemicals under apple and pear trees as a substitute for hoeing and cultivating, as well as to determine the safety and relative costs of chemical treatment. "Karmex" diuron weed killer has shown significant promise in tests made during the past few years at experiment stations in several states, including Washington, Missouri, New York, Wisconsin, and Virginia. In some of these tests, "Karmex" was combined with other herbicides—dalapon and the dinitros in oil, for example—to give an effective combination for contact and residual weed control.

While considerable progress has been made, additional tests are necessary to provide data on the safety and effectiveness of "Karmex" for a variety of soil types, tree species, and moisture conditions. It appears certain that "Karmex" or some other chemical will become a common "tool" in the cultivation of apple and pear orchards within a few years.

WHAT KIND OF GROWTH DO WE WANT?

By Robert L. Hershey*
Vice President
E. I. du Pont de Nemours & Co. (Inc.)

THERE is one special aspect of our historical growth and of the future economic growth we desire, which I particularly wish to emphasize and discuss: Innovation is the whole complex of doing old things in new ways, of doing things never done before, of improving old products, and of bringing forth wholly new products. It is the process by which we achieve growth which is not merely quantitative but is qualitative as well — and thereby contributes to the welfare and progress of our society.

The distinguishing mark of the American economy has been a genius for innovation. This has required ingenuity, inventiveness, research, experimentation, and, above all, a willingness in business to welcome change and take risks. There is no more remarkable example of qualitative growth than the history of American agriculture. In 1800, less than two centuries ago, it took nine workers on the farm to produce enough food and fiber for themselves and for one other. Only one out of every 10 workers was available for nonagricultural pursuits. If we farmed no better today than we did in 1800, we would have 63 million out of our 70 million work force tilling the soil.

The American farmer has always been regarded as a conservative, but in his willingness to use changing methods in his quest for greater productivity, he has no peer among liberals. He has replaced the horse and the mule with the tractor, and eagerly used countless other modern specialized farm implements. He has used improved seeds, fertilizers, insecticides, and other chemical products in his drive to produce more on the same land with less human effort. He has not only kept pace with the times, but has run ahead of them.

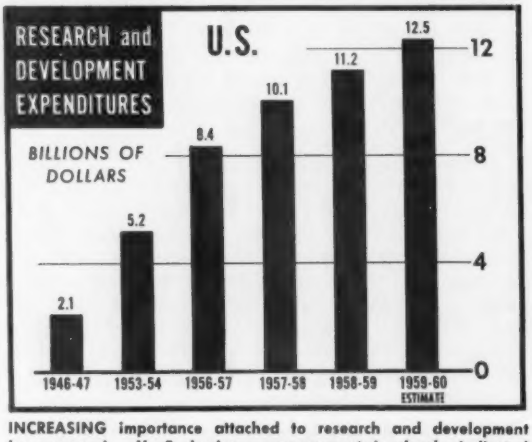
In industry, as in agriculture, no one would deny that innovation is and has been the key to really significant growth. Those of us who have reached middle age need only to contrast our childhood with our mode of living today to recognize that startling changes have been made. I know of no statistical measure which has been devised to show the influence of innovation on general industrial growth, and, of course, its impact has been greater on different economic areas at different periods of our history. In recent years, the chemical, electronics, and pharmaceutical industries have been examples of especially vigorous innovation.

THE DISTINGUISHING MARK OF THE AMERICAN ECONOMY HAS BEEN A GENIUS FOR INNOVATION

Innovation also results in the creation of entirely new industries. The development of a safe refrigerant and small, efficient electric motors paved the way for the huge refrigerator and air-conditioning businesses. The automobile revolutionized the rubber and oil industries and brought into being the vast complex of filling stations, garages, roadside eating places, and motels characteristic of the American scene.

While it thus may be seen that every business changes, if it wants to stay in business, most of the organized technical research and development is concentrated in manufacturing companies. Furthermore, it is estimated that half of our industrial research is carried on by four of the twenty-four manufacturing industries — electrical, machinery, chemicals, and scientific instruments.

Industrial research is costly, and it is always a gamble. Yet, the increasing importance attached to it by progressive business management was reflected by a recent article in *The New York Times*, which estimated there are more than 5,000 industrial laboratories today, compared to some 200 in 1920. The article reported that $12 billion will be spent this year on research and development, compared to slightly more than $5 billion just five years ago.



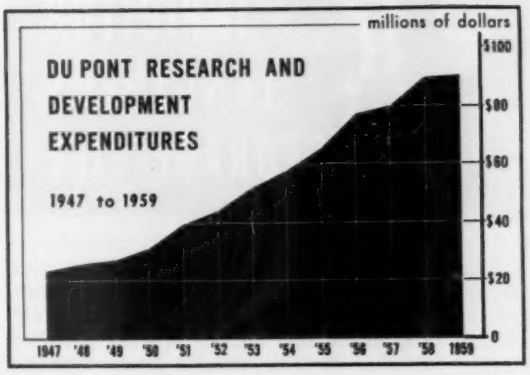
INCREASING importance attached to research and development by progressive U. S. business management is clearly indicated by the sharp rise in expenditures for this activity in recent years.

* *Excerpts from an address before the Business Conference, University of Kansas, April 9, 1960.*

Research and development expenditures in the Du Pont Company are running at the rate of $90 million a year. About $14.5 million of this amount is spent annually for basic research — that is, inquiry which seeks new knowledge, without specific commercial objectives, in scientific fields which are related to the company's operations†. We always hope, of course, that new knowledge from basic research may some day lead to a commercial opportunity, just as a study of giant molecules in the 1930's led to the first man-made fiber, nylon.

If, innovative growth is essential for the bright future we all desire, it is equally important to recognize that there are accompanying problems which our society must be prepared to meet and solve. In agriculture, innovative growth has left us with the problem of farm surpluses. I almost said surplus farms, for it seems to me inevitable that when the farm problem is finally solved, we shall find many people have left agriculture for other lines.

The problems presented by innovative growth in industry are not crop surpluses, but they also can be troublesome. Some innovative changes cause no serious dislocations in the existing industrial structure. Others have the effect, sooner or later, of making existing investment and jobs obsolete, with attendant dislocations in people's lives. For society as a whole, and over the long pull, each such dislocation is only temporary, for our whole industrial history shows that the end result is more jobs, more leisure and everything we mean by a higher standard of living. But individuals caught in the dislocations may find their personal situations even tragically disrupted.



DU PONT Company's annual expenditures for research and development are running at $90 million, about $14.5 million of which is for basic research without specific commercial objective.

†*For a successful example of this program, see p. 4.*

NEW TRICK CUTS SILAGE LOSS

From the time of the first American farm silo, erected in Maryland in 1876, until quite recently, one big problem has plagued silage production — spoilage.

The latest techniques show that this loss can be virtually eliminated through use of black Du Pont polyethylene film for silo caps or covers, plus good planning and care.

Here's how: Check your county agent or state university on correct silo size for your herd, and the procedures and additives required for making the best quality silage from the forage to be used. Be sure to pack rapidly and well to expel as much air as possible.

Tower Silos. Cut circle of four mil black Du Pont polyethylene film two feet greater than inside diameter of silo. Press down tightly over silage. Turn edges up. Weight down (old rubber tires are excellent).

Silo-Cap

Bunker Silo. Slope top of pile so that rain and seepage can drain away. Round and smooth top and open end of pile, cover with six mil black Du Pont polyethylene, allowing one foot excess on each side. Turn edges up to form drain gutter. Weight down gutter edge with smooth logs or poles, and top with tires, etc. Unless sides of bunker are airtight, it's a good idea to line them with the film.

Bunker

Trench Silos. Fill so that the top and edges of pack are slightly higher than ground level. Slope for drainage. Cover with six mil black Du Pont polyethylene, wide enough to extend several feet beyond trench sides. Cover edges with earth. Weight down top. Fence off animals.

Trench

Stack Silos. Round top and smooth sides for good drainage. Cover whole stack tightly with six mil black Du Pont polyethylene, allowing two foot excess all around. Bury edges, weight top and sides. Fence off animals.

Stack

Remember: Keep silo closed tight until ready to start feeding. Then keep feeding silage at steady rate until used up.

MOLD INHIBITOR LENGTHENS FEED STORAGE LIFE

Storage life of certain feed ingredients and formulations may be doubled or tripled by addition of up to 0.4 per cent Du Pont "Impedex" sodium propionate NF during processing. This simple, low-cost process results from over six years of research and commercial development.

The Texas Agricultural Experiment Station reported in 1953 that mold is generally responsible for heating of feedstuffs under warm, humid storage conditions. Sodium propionate and calcium propionate, used for over 20 years by bakeries to inhibit mold, were effective for similar protection of corn meal. As a result, the Du Pont Company undertook development of a formulation and commercial recommendations for the feed industry.

All grains as harvested are contaminated with mold spores. Processing may substantially reduce the initial spore-count, but storage and handling are likely to result in re-inoculation. Under proper temperature and moisture conditions these molds begin to grow, causing feed to heat. They may also produce off-colors, odors, and tastes which make the feed unpalatable to livestock.

The trend toward high-energy feeds has intensified the problem, because mold organisms can also use the extra energy for growth and heat production. Molasses makes a feed formulation especially susceptible to mold because it increases the initial moisture content and the mixture's pickup of moisture from the air under humid storage conditions.

Laboratory Studies Made

The Du Pont laboratory studies included corn meal, brewer's wet and dried grains, fish meal, vegetable oil meals, molasses, dog food, horse feed, pellets of coastal Bermuda grass, and various common types of rations for dairy cattle, beef cattle, and poultry. The protection given by various levels of "Impedex" was found to depend on moisture, storage temperature, and pH of the feed, and the concentration and viability of mold spores. Feeds remained mold-free about twice as long at 70° F. as at 90°, with or without "Impedex".

Moisture content, which affected susceptibility to mold, frequently increased as feed absorbed moisture from the air. Reduction of pH by one point doubled the effectiveness of the "Impedex", but reducing the pH without inhibitor to as low as 3.7 had no effect.

For fish meal, a combination of "Impedex" with salt was more effective than either one alone. For fish meal which started to heat after six days of storage at 90° F., 0.2 per cent "Impedex" plus 2.0 per cent salt increased heat-free life to 29 days.

Sodium propionate is accepted as a mold inhibitor by the Association of American Feed Control Officials and must be shown on the label when used. It is also listed by the U.S. Food and Drug Administration as a "substance generally recognized as safe" in the *Federal Register* of November 20, 1959.

HOW TO CONTROL WEEDS IN LAWNS

Weeds are the result, not the cause, of a poor lawn. A dense, vigorous lawn which resists infestation by broadleaf weeds is the basis for permanent weed control. Faulty lawn care is an invitation to weeds. The most frequent mistake is cutting grass too close. Other causes might be poor drainage, weed infested top dressing, buried debris, or compacted soil.

The lawnmaker has an excellent weed control weapon in selective weed killers which make short work of broadleaf weed species like dandelions, plantains, knotweeds, ragweeds, and wild onion, as well as poison ivy, poison oak, and sumac.

Chemical Upsets Weed Growth

Foremost for control of broadleaf lawn weeds is 2,4-D in formulations such as Du Pont's lawn weed killer. This is a nonvolatile, synthesized plant hormone that upsets weed growth so much that weeds die about a week after treatment. Due to the special formulation, there is little danger of fumes injuring desirable plants and shrubs—one of the problems with some other 2,4-D products.

Broadleaf weeds are easiest to kill when they are young and in active growth. Late spring, the peak period of weed growth, is the best time to apply 2,4-D. Pick a still, warm, sunny day when rain is not expected for at least 12 hours. Apply the weed killer in a coarse spray under low pressure. The Du Pont garden sprayer hose attachment with its 10-gallon nozzle is ideal for this purpose. Avoid mowing for three or four days following an application.

Renewed Interest in METHOXYCHLOR FOR FORAGE CROPS

By JOSEPH A. EVANS, Ph.D.
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The government ban on heptachlor as a foliage spray on alfalfa and other forage crops has refocused attention on methoxychlor. Earlier this year, the Food and Drug Administration rescinded the tolerances on heptachlor on the basis of "new scientific evidence" showing that heptachlor epoxide, a breakdown product of the pesticide, appeared in "meat and milk when forage containing it is fed to experimental meat and dairy animals."

Methoxychlor is one of the so-called well-established pesticides and is effective for control of such pests as alfalfa weevil larvae, armyworms, spittlebug, clover leaf weevil, and others. It has a tolerance on major forage crops of 100 parts per million, based on extensive research by the Department of Agriculture.

Methoxychlor has found wide application for the control of hornflies on dairy cattle. When "hand dusted," according to label directions, it leaves no residue in meat or milk and is fully registered by U.S.D.A. for this use.

The FDA action leaves methoxychlor, in many cases, as one of the few effective insecticides remaining in the recommendations when the crop is to be grazed or used for dairy cattle or beef being finished for slaughter. In recent weeks, several experiment stations have restated the suitability of methoxychlor for forage spraying.

The New Jersey Agricultural Experiment Station[1], for example, states that "methoxychlor at three quarts (emulsion concentrate) per acre will do the best job of recommendable materials, although the cost is greater than heptachlor." New Jersey recommends a methoxychlor dosage of one to 1.5 pounds per acre for alfalfa weevil and spittlebug, with application sometimes at 10 to 12 inches of stem height, "but often as late as 18 to 20 inches." For spittlebug on clovers and mixed hays, the recommendation is one pound at six-inch stem height. Against potato leaf-hopper on alfalfa, the recommendation is also one to 1.5 pounds, "at any time, usually right after second cutting harvest." In most cases, seven days must elapse between the application and harvest.

Recommendations and directions for use of methoxychlor were also made by the North Carolina State College of Agriculture[2], the College of Agriculture of the University of Wisconsin[3], the University of Maryland[4], and the University of Delaware[4].

Du Pont "Marlate" 2-MR and "Marlate" 50 methoxychlor insecticides are registered for effective insect control on alfalfa, clover, grass, cowpea, peanut, and soybean forage. The tolerance on all of these crops is 100 parts per million. "Marlate" 2-MR, being an emulsifiable concentrate, is suitable for use in conventional spray equipment. "Marlate" 50 and Du Pont Dairy Cattle Insecticide, as 50 per cent wettable powder formulations, are suitable for the popular "hand-dusting" method of horn fly control on dairy cattle.

Methoxychlor is the only residual chlorinated hydrocarbon insecticide that has Federal clearance for use directly on dairy cattle.

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1. *Rutgers University: "Alfalfa-Clover Insect Control, Recommendations 1960."*
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3. *University of Wisconsin, College of Agriculture: "1960 Insect Control," Circular 520A, January, 1960.*
4. *The Southern Planter: "How to Control Alfalfa Weevils," March, 1960.*

new PRODUCTS AND APPLICATIONS

A push-button spray protects trees and shrubs from crawling insects, as well as rodents, by depositing a tacky, exceedingly sticky compound on trunks or branches. Insects are trapped in the spray, while rodents get an uncomfortable sensation in the pads of their paws and have such difficulty in getting out that they invariably back down. The product is odorless and harmless. The push-button spray dispenser makes it easy to apply, even on rough tree bark and around the crotches. The Du Pont Company manufactures the "Freon" propellent which is used to provide the sprayer pressure.

* * * * *

A comfortable urethane respirator provides protection against dust encountered in farm work. It consists of a molded foam face piece, a plastic chassis housing an inhale valve and two exhale valves, and an adjustable neckband attached to a plastic outer frame. Weight is just a little over one ounce, but it provides 25 square inches of filtering area—as much as eight times the functional area of most conventional dust masks. The foam unit can be washed with soap and water and immediately reused. Replacement filters are available in case of damage, but the unit is reusable indefinitely with normal use.

* * * * *

"Teflon" TFE flurocarbon resins have been accepted by the Food and Drug Administration for use in food processing and canning applications. "Teflon" 6 TFE resin had previously been cleared by FDA for commercial dairy equipment, where it is used primarily for gaskets and lined equipment such as valves, fittings, and pipe. Conventional equipment relies on expensive metal alloys to withstand the frequent dismantling, brushing, corrosive cleaning solutions, and steam sterilization required in milk processing. Although it is 1,000 times more expensive than paper, the resin cuts over-all maintenance costs up to one-third.

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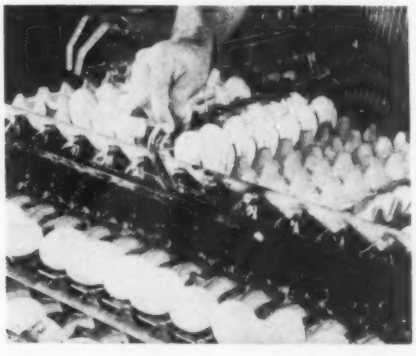

All equipment units of the H & P Egg Cleaner Manufacturing Company are now fitted with brushes using bristles of Du Pont "Tynex" nylon filament. These brushes have stood up during 10 years and more of continuous use, despite exposure to harsh chemicals and high friction which clogged or wore out conventional brushes. The CM model, for example, uses two 30-section washing brushes, each 54 inches long, and two wiping brushes, one 29 inches and the other 24 inches. A moving belt conveys the eggs through the cleaner and on into the candling, grading, and packing phases of their processing.

* * * * *

Two new monofilament lines engineered for free-spool casting and surf and trolling reels—"Stren" oval casting line and "Stren" oval surf and trolling line—will soon be available. The unique oval shape permits them to lie flat and firm on the reel. Coils of line do not slide over or slip under one another, nor spring up to cause a back-lash when tension is released. Even limper than round monofilaments of the same pound test, they resist ballooning during a cast, bringing more water within reach of the shorebound fisherman. In trolling or retrieving, the oval shape helps to stabilize the line, providing built-in twist control.

Newly developed shoe welting of neoprene resists farm chemicals, mud, moisture, and barnyard acids, as well as cutting by stitches. Neoprene is compatible in stretching and flexibility with all types of synthetic and natural rubber soles. Use of this welting eliminates a complete processing step, the operation required to form conventional leather welting for stitching. Neoprene, a 20-year standard for long-lasting soles, is preformed, ready for stitching. It can be extruded in continuous lengths for packing in rolls, avoiding waste in cutting.

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Farmers will find adequate supplies of Du Pont's new agricultural polyethylene film at dealers when a nationwide distribution network starts shortly. The tough, economical film will be available clear and black, in three gauge sizes, and in widths from three to 40 feet. The new film is used on the farm for silage covers; liners for bins, tanks, ponds, and irrigation ditches; mulch covers; fumigation blankets; material and equipment covers; cold frame and greenhouse glazing; and window weatherproofing on poultry and animal houses. Du Pont polyethylene film is also used in home construction as a moisture barrier in walls, floors, and over dirt crawl spaces.

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Results of research studies begun in 1952 show that nylon twine provides a superior method of tagging fish for migration studies. The twine was used to attach a $\frac{3}{8}$-inch plastic tag with a modified upholsterer's needle. Nylon twine was found to be non-harmful to fish, while retaining its flexibility and tensile strength in salt, as well as fresh water. In addition, the fish recovery rate was higher than with other materials, probably because the tag and twine combination does not hurt the fish and is more durable. Thus a more accurate scientific measure of fish migration is being achieved with this method.

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A special sleeping bag insulated with five pounds of "Dacron" polyester fiberfill provides comfort on fishing and hunting trips. Tailored for use in station wagons, the bag is five feet wide and seven long. Each side has a separating zipper, permitting the top half to be removed to form two separate units. Du Pont "Dacron" fiberfill is particularly suited for this: It is resilient, seals in body warmth, absorbs very little moisture, and does not attract insects. One of the new bags was shipped to the U.S. exhibition in Moscow.

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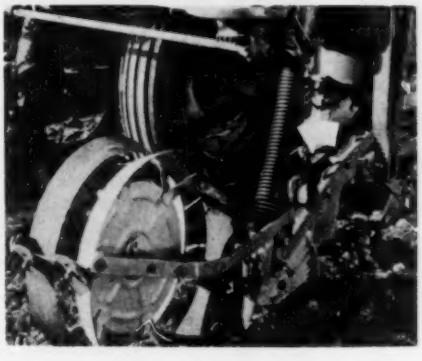


Corrosion and mechanical damage to metal tubing on fertilizer and grain drills are eliminated through use of molded neoprene hose. The flexible tube is undamaged by bending or squeezing and resists the effects of chemicals, sunlight, air, and weather. The neoprene hose is ribbed and is constantly stretched and compressed as the boot rides over the ground, keeping fertilizer or grain from adhering to the discs and clogging the passage, a frequent problem with metal tubing. Neoprene is estimated to outlast steel three to one. Several firms are supplying replacement kits so farmers can make the conversion.

* * * * *

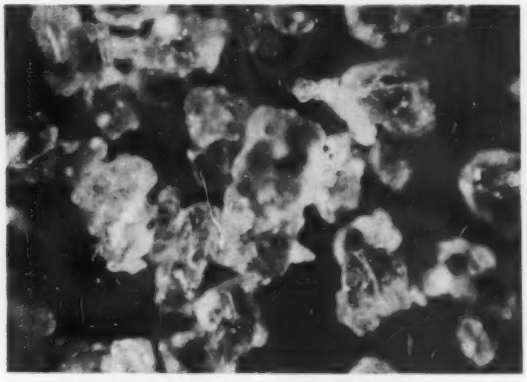
Garden hose made of Du Pont "Hypalon" synthetic rubber promises decades of unimpaired service. Long used in industrial applications, it has demonstrated its resistance to heat, sunlight, chemicals, handling, and abrasion. Exposure to the hottest sunlight will not soften this hose, nor will it become brittle at freezing temperatures. Even smog loaded with ozone, natural rubber's deadliest enemy, will not affect "Hypalon". The synthetic rubber can be permanently colored and is available in regular garden hose or heavy duty hose.

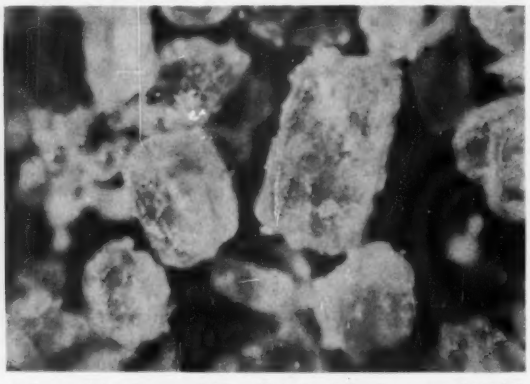
FREE-FLOWING UREA COMPOUND DEVELOPED

A new technique for conditioning and sizing urea particles developed by the Du Pont Company makes possible the production of a ruminant feed compound that is fully free-flowing and non-caking. The improved "Two-Sixty-Two" feed compound, suitable for continuous or batch mixing, is in full production at the Company's Belle, W. Va., plant.

Unless properly conditioned and sized, urea has a natural tendency to cake in storage and segregate in feed mixtures. The extent to which the new process affects urea particles is shown by the accompanying microphotographs.

"Two-Sixty-Two" was introduced by Du Pont in 1945. It was the first large-volume commercial source of high-purity urea produced for the formulation of ruminant rations. The compound provides a 42 per cent nitrogen source from urea and derives its name from the fact that it is equivalent to 262 per cent crude protein.





POORLY COATED sample of urea (microphotograph on the left) shows a greater tendency to cake because of the exposed surface of the particles. Improved "Two-Sixty-Two" feed compound (right) shows completely coated particles retain free-flowing property.

PELLETED FENURON MAKES BRUSH CONTROL EASIER

Development of the pelleted formulation of fenuron, one of the new substituted-urea herbicides, has made available an easy and versatile method for controlling woody brush on farms. "Dybar" fenuron weed and brush killer gives positive control of brush with one low-cost treatment. Being nonvolatile, the pellets can be used near sensitive crops. "Dybar" is noncorrosive, nonflammable, and presents no hazard of toxicity to man or animals when used according to directions.

"Dybar" can be used anytime ground is not frozen. The pellets are used just as they come from the package without expensive and cumbersome equipment. "Dybar" can be applied a tablespoonful at a time, either every three feet over the area, or (for sparse brush) at the base of each clump of bushes. For more extensive areas, it may be applied broadcast, at 50 to 75 pounds per acre, by hand or spread with a centrifugal seeder. Use of a seeder for application will scatter the pellets over a radius of 10 feet or more at a time.

A ten-quart bucket will hold about 10 pounds which will treat from 700 to more than 1,000 feet of fence-row eight feet wide.

PELLETED formulation of fenuron herbicide allows ease and versatility of application: Hand spread (top), use of centrifugal seeder (lower left), or with a measuring spoon (lower right).

Successful new tool-

PORTABLE MIST BLOWERS FOR BRUSH CONTROL

Another weapon has been added to the arsenal for brush control: A one-man portable mist blower that can be used in areas inaccessible to standard power spraying equipment. Although chemical brush control has been widely adopted, problems of terrain and availability of water have limited use of power equipment in some areas or greatly added to the cost of application.

Reports presented at the Northeastern Weed Control Conference in 1959 and 1960 give details on the successful use of a small knapsack-style mist blower dispensing a spray of highly concentrated "Ammate" X weed and brush killer. The equipment, which weighs only 35 pounds and holds from 2½ to 2¾ gallons of spray, is a simple air-blast unit requiring no appreciable pressure in the tank. The mist is created by blowing air at a velocity of 250 miles per hour through a stream of solution. At full throttle, it gives good coverage of brush at a distance of 12 to 15 feet from the operator.

Paine[1] reported the use of eight pounds of "Ammate" X in two gallons of water, plus one ounce of Spreader-Sticker. The spray formulation used by Klitsch[2] consisted of 360 pounds of "Ammate" X—plus one quart of Spreader-Sticker, five gallons of number 2 fuel oil, and one pint of Emulsifying Agent A in 100 gallons of water. On most commercial high-volume spray, the concentration of "Ammate" X normally ranges from 50 to 60 pounds per 100 gallons of mixture.

Advantages Reported

In addition to the value of the portable spray equipment for inaccessible areas, these workers report the following advantages:

1. Mist blowers constitute a relatively low investment in equipment, as compared to large hydraulic sprayers.

2. Crews using portable equipment are much more mobile than those with hydraulic equipment and are, therefore, able to spend a greater proportion of time actually spraying.

[1] *ARCHIE W. PAINE: "Chemical Brush Control on Public Watersheds and Supply Lines," Northeastern Weed Control Conference, 1959. Mr. Paine is General Superintendent, Sources of Supply, Metropolitan District Water Bureau, Hartford, Conn.*

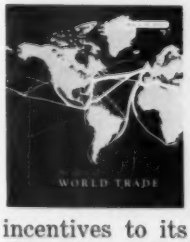
[2] *FRANK E. KLITSCH: "Advantages of Mist Blower Application of 'Ammate' X for Brush Control," Northeastern Weed Control Conference, 1960. Mr. Klitsch is with the Alpine Tree and Landscape Corporation, West Acton, Mass.*

PORTABLE mist blower can be easily carried, providing a means of brush control in areas inaccessible to mechanized equipment.

3. Mist blowers permit a reduction of 80 to 90 per cent in the amount of water used.

Obviously, the portable equipment will not replace wheeled equipment in accessible areas where it is possible for a sprayer to move much faster than a man can walk. But it does provide a useful tool for many types of brush control jobs where a man on foot is better able to operate than heavy machinery.

BOOKLET TELLS STORY OF WORLD MARKETS



Foreign competition presents a new and important challenge to America's economic and technical progress, and to its military security. To meet it, the U.S. must increase its industrial productivity, and provide strong incentives to its people. This is the theme of *The Story of World Trade*, a new booklet in the *This Is Du Pont* series.

The 32-page picture publication traces the history of international trade and describes the changes that have made foreign competition a factor of major significance to the U.S. For a free copy of *The Story of World Trade*, write to Editor, *Agricultural News Letter*, Du Pont Company, Wilmington 98, Delaware.

NITROGEN RAISES RICE YIELD

Rice plants receiving nitrogen at 100 pounds an acre before reflooding produced more seed than unfertilized plants, in greenhouse studies of water management and rice fertilization. The older the plants at time of fertilization, the higher the yield. Delaying fertilization and initial flooding increased seed yield. Yield increased 34 per cent for plants fertilized at 41 days, and 48 per cent for plants 62 days old, compared to plants that were fertilized and flooded when 20 days old. Unless plants were fertilized, draining, drying the soil, and reflooding were of no benefit in increasing seed production on soil low in organic matter. Water management and nitrogen fertilization can affect leaf color without influencing yield. Leaf color is not, therefore, a satisfactory guide for estimating plant productivity. — AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS.

CONTROLLING WATERMELON LEAF DISEASES

Two leaf spot diseases of watermelon are of major concern in Arkansas: anthracnose *(Colletotrichum lagenarium)* and Cercospora leaf spot *(Cercospora citrullina)*. In 1957, tests were begun to study fungicidal control measures. Maneb and zineb fungicides* were the most active of 12 materials tested. Further studies were made in 1958 and 1959. The yield of the Black Diamond variety, susceptible to both diseases, was increased 149 per cent by maneb (2 lbs. per 100 gal.) and 106 per cent by zineb (2 lbs. per 100 gal.). Yields of Charleston Gray, affected only by *Cercospora* leaf spot, were increased 71 per cent by maneb (1½ lbs. per 100 gal.) and 65 per cent by zineb (2 lbs. per 100 gal.) — AGRICULTURAL EXPERIMENT STATION, UNIV. OF ARKANSAS.

* *Du Pont manufactures "Manzate" maneb fungicide and "Parzate" zineb fungicide.*

COWS LIKE AIR-CONDITIONED SHELTERS

Research in Missouri shows that air-conditioned dairy shelters may be profitable for dairymen if average daily temperatures and relative humidity are excessive for 60 days or more each year. In a well-insulated, 100-cow, stall-type dairy barn, air-conditioning could prevent a 10 per cent decline in milk production on days when outside temperature is 80° and the relative humidity higher than 75 per cent. — U. S. DEPT. OF AGRICULTURE.

REDUCTION OF SOIL NITROGEN LEACHING

Nitrogen leaching may be reduced somewhat on soils of high base-exchange capacity by applying ammonium or ammonium-forming sources of the element. The ammonium ion is held in the exchange complex in the same manner as any other cation, until oxidized to the nitrate by soil microorganisms. This takes place rapidly at soil temperature above 50° F. but becomes nil at freezing. Where soils freeze in winter, it is possible to apply ammonium forms of nitrogen fertilizers after soil temperature falls to 50° F. in autumn, without appreciable losses before crops are planted in spring. Soils containing residual nitrogen in humid regions with warm winters should be planted to a cover crop which absorbs nitrates and holds them against leaching. Tropical conditions are favorable for rapid conversion of nitrogen into nitrate. Losses may be minimized by keeping the land cropped and using legumes in rotation. —FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (Vladimir Ignatieff and Harold J. Page, *Efficient Use of Fertilizers,* Rome, 1958).

CORN CHEMICAL AFFECTS BORER EGG LAYING

Corn borers feed on corn, because it is where they hatch out; not because they prefer corn to other plants. But corn plants have a definite attraction for female borer moths, and egg-laying habits may be explained by chemicals present in the plant tissue. Adult moths choose healthy plants in preference to those already infested or otherwise injured. A chemical which repels the moths is released from damaged leaves.

To detect the attractants and the repellents in corns, moths were offered a choice of two pieces of perforated waxed paper on which to lay their eggs. Specific corn leaf odors were passed through one, while the other was "odorless." Egg count was highest with odors coming from fresh, uninjured corn leaves. Apparently the chemicals which attract the female are soluble in both ether and methanol, because leaves washed with these materials did not give off odors which attracted egg laying. Frozen and damaged leaves were least popular, supporting the idea that injured leaves released repellents to egg laying.—COLLEGE OF AGRICULTURE, UNIVERSITY OF WISCONSIN.

UREA FOR FERTILIZATION OF RANGELAND

Urea was applied to different rangeland plots from September to March during one wet and two dry years. Early fall application produced more winter feed than late fall applications, but, for production of spring feed, applications to the middle of February were just as effective. Urea applied in March was too late for best late-spring feed production. Protein content was increased by winter fertilization. The earlier urea was applied, the less the protein content was increased. Total protein per acre did not, however, change with dates of application. Reduced protein content on plots fertilized early in fall resulted from increased growth. Urea application from September to February did not change the protein content of the forage in late spring, but March application did. The March urea was absorbed, but not fully utilized in increased growth as were earlier applications. — COLLEGE OF AGRICULTURE, UNIVERSITY OF CALIFORNIA.

SAVINGS REALIZED FROM WEED CONTROL IN COTTON

Chemical weed control saved Mississippi cotton farmers $960,000 in 1957, $1,500,000 in 1958, and $2,500,000 in 1959. Use of chemicals to control weeds in pastures has also been increasingly profitable. Approximately 37,000 acres were treated in 1957, 75,000 acres in 1958 and 125,000 acres in 1959. Usable forage has been increased as much as 400 per cent where chemicals were employed, which could mean four times as many animals per acre. — AGRICULTURAL EXPERIMENT STATION, STATE COLLEGE, MISSISSIPPI.

CONTROL OF STRAWBERRY GRAY MOLD

"Thylate" thiram fungicide was applied to strawberries on a ranch in California, at five pounds (in 400 gallons water) per acre on February 23, March 17, and April 8. The weather during this period was dry. One inch of rain fell April 19 and berries were picked May 2. By following pickers down the row and taking three 19-foot replicates in each block, samples were taken of rejected berries. A comparison with controls showed that 2 lbs. 9 ozs. of berries were rejected in treated plots for 30 foot of row, compared to 6 lbs. in controls. On the basis of the May 2 fresh market price, the loss due to gray mold rot in the untreated areas amounted to $770 per acre, about $440 more than in areas treated with "Thylate". The cost of the chemical per acre was about $15 for the entire season, plus cost of application. — DU PONT COMPANY.

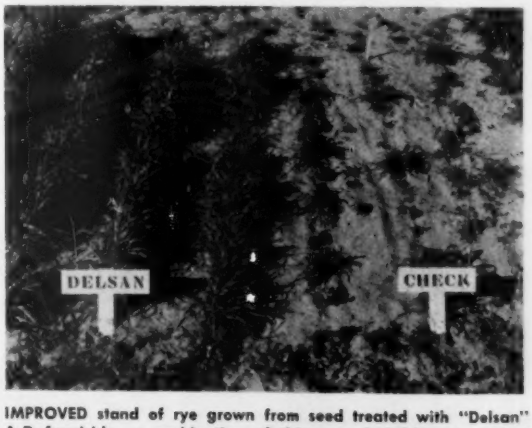
NITROGEN FOR RICE INFESTED WITH BARNYARDGRASS

Barnyardgrass *(Echinochloa crusgalli)*, one of the most serious weeds that affect rice in Arkansas, can seriously reduce yields. During 1957, 1958, and 1959, studies were conducted to compare the responses of rice to nitrogen under low and high weed grass infestations. The grass was in the vegetative, heading, and maturing stages of growth when the nitrogen was applied at 3, 8, and 12 weeks (plots were flooded at the 12-week application).

Weed-free rice that received no nitrogen produced yields equal or higher than heavily infested rice receiving 120 or 180 lbs. of nitrogen per acre. Under infestation, the best yield was obtained at 180 lb. per acre applied when the grass was heading. Split applications of 120 lbs. of nitrogen per acre were less effective than a single treatment when the grass was heading with low infestation. Split applications of 120 lbs. of nitrogen per acre gave better yields and affected height and maturity of rice less than a single application. — AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS.

A NEW TREATMENT FOR RYE

Seed treatments of rye with mercurials have frequently not been adequate for proper stand establishment of rye in the southeastern states. Studies by Dr. H. H. Luke in Florida have established that a complex is involved. In this, storage insects, *Helminthosporium* species, the local adverse seed storage conditions that are



IMPROVED stand of rye grown from seed treated with "Delsan" A-D fungicide, a combination of thiram and dieldrin, is evident from comparisons with plot in which untreated seed was planted.

conducive to injury from the mercurials, and an unknown soil factor, all contribute to the stand difficulties. Seed treatment with "Delsan" A-D, a combination of thiram fungicide and dieldrin insecticide, was found to be not only superior to other seed treatments, but appeared to solve the difficulty.

Industrial Research to Determine SAFETY OF FARM CHEMICALS

One of the largest cost items in developing a new food-or-farm chemical is the research necessary to assure its safety. In recent years, chemicals have assumed rapidly growing importance in the production, processing, and preservation of food. Today's high farm productivity is largely the result of such chemicals—herbicides, pesticides, and fertilizers.

Chemical pesticides, according to Rutgers University, "are perhaps the most important ingredient in today's intensive agricultural production . . . . Throughout the development of plants, applications of pesticides are essential for their protection . . . . Pesticides have become so essential in crop production that this might rightfully be called an era of chemicalisation in agriculture."

Dr. George Decker, University of Illinois entomologist is quoted as saying that if agricultural chemicals were banned tomorrow, the yield of many crops would be reduced 10 to 90 per cent. The retail price of most food items would double. Some would triple. Many fruits and vegetables would disappear from the open market. Even with the wide-spread use of chemicals, Decker estimates that pests destroy up to $5 billion of food products per year.

As pointed out in a recent report by the U.S. Food and Drug Administration, "during the past half century, the science of food chemistry has made tremendous progress. The growing, processing, and packaging of food so that it can be transported for thousands of miles and remain in good condition for months or years, is one of the wonders of modern civilization."

Assurance of an ample and safe food supply has freed a large proportion of America's human and economic resources from the task of producing food. So it has become quite literally the foundation for our development in arts, sciences, exploration, industrial development and the other pursuits that men have found so absorbing down through history.

The economic incentives for American farmers and the food industry to provide this ample and safe food supply have proven more effective than any government decree or police action could hope to be. These same economic incentives are the best assurance of high standards of safety for chemicals used in food production. The country cannot rely on the authority and police power of government agencies to maintain either quantity or quality in food production. Police action can deal with outlaws, but the greatest protection for the consumer is the desire of his suppliers to continue successful in business and the integrity and conscience of their business practices.

Most of the 360 federal, state, and local rules which apply to chemicals used in food production merely require, in a particular form, the kind of information which Du Pont prepared

Typical Sample Extraction . . .

FREEZER STORAGE prevents chemical changes in fruits and vegetables checked for residues.

Extraction of chemical from measured food crop sample is first step in residue analysis.

Residue of monuron forms a dye which is separated from other chemicals in extract.

itself to develop when the Company's Haskell Laboratory for Toxicology and Industrial Medicine was founded 25 years ago. Haskell was unique among industrial laboratories at the time of its creation. It was then primarily concerned with health hazards encountered by Du Pont employees in making and using chemicals. Today, the safety checking of farm and food chemicals is a major share of its work.

This program is part of the Company's exhaustive effort to establish the basis for safe use of farm chemicals. The degree of hazard includes two factors—toxicity of the chemical, and degree of exposure. The program at Haskell determines the basic toxicity of candidate compounds, and evaluates the degree of exposure which can be permitted without exceeding the safe level of exposure.

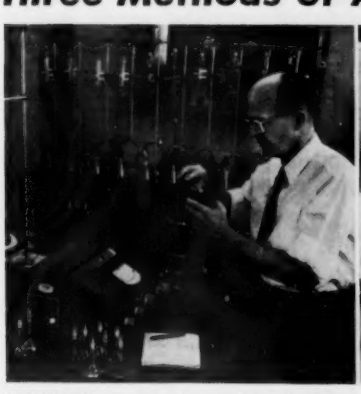
The Haskell Laboratory is equipped to make all safety tests considered essential in studying chemicals for food production. Its five sections — Toxicology, Biochemistry, Pathology, Physiology, and Physics — are an integrated research system. Typical of the long and complex procedure involved in the testing of chemical products that might reach human food is the following step-by-step operation: (1) The lethal dose of a product is established with laboratory animals. Pathological studies on the tissues and organs determine the exact effects of the chemical. (2) "Subacute" tests are made for a 10-day period, with each experimental animal receiving one-fifth of the fatal dose per day. The total amount equals twice the lethal dose. If there are no ill effects, it is obvious that the chemical has been eliminated or destroyed. (3) As a next step, 90-day feeding tests are made. (4) When necessary, two-year tests are made to establish long-range effects of new products.

Since detection of residues is essential to determination of safe levels, the Industrial and Biochemicals Department, which produces Du Pont's biological and farm chemicals, undertakes microanalytical research for this purpose. Reliable methods have been developed to detect fractional parts of such chemicals per million with sensitive electronic equipment. Analytical methods may depend on absorption and transmission of various light wave-lengths, thermal conductivity or ionization of volatilized samples, or (for experimental work) the identification and measurement of "tagged" radio-active isotopes.

The minimum safety standards established by Du Pont researchers for biochemical products is in the order of 100 to one. In other words, a chemical intended for use in food production has to be effective at rates which leave less residue than one one-hundredth of the amount found to be safe in the Haskell tests. The research and the laboratory results and recommendations are submitted to the U.S. Department of Agriculture (for farm chemicals) and the Federal Food and Drug Administration (for both farm chemicals and food additives). Only after government approval is given and proper label instructions are worked out may a product be used in connection with food growing or processing.

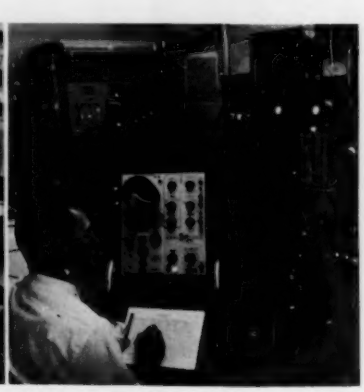
The extensive testing and exceptional care undertaken by companies like Du Pont assures safe use of their products.

Three Methods of Analysis . . .



MONURON concentration is determined by dye intensity measured by spectrophotometer.

To distinguish monuron from diuron, gas chromatography uses volatilized samples.



Liquid scintillation spectrometer identifies and measures radioisotopes in compounds.

CRAWFORD H. GREENEWALT, President of the Du Pont Company, discusses farm problems with 4-H Club leaders who visited Company offices and laboratories during "4-H Club Week."

NATIONAL OFFICERS of the Future Farmers of America read a report on agricultural chemicals during their annual tour through Du Pont Company laboratories and offices at Wilmington, Del.

FARM YOUTH GROUPS VISIT DU PONT

Two delegations of leaders among farm young people were recent guests of the Du Pont Company in Wilmington, Del. The national officers of the Future Farmers of America made their annual visit to company offices and laboratories and six 4-H Club representatives spent one day of "National 4-H Club Week" as Du Pont guests.

Clark W. Davis, general manager of Du Pont's Industrial and Biochemicals Department, says such occasions make it possible to help "strengthen friendship between the business community and the new generation of farm people. We welcome these annual visits because they give business a chance to get acquainted with each year's new leaders."

Tour of Laboratories

The 4-H group was accompanied by officials of the U. S. Department of Agriculture, the National Committee on Boys and Girls Club Work, and two state 4-H leaders as chaperones.

The young people were taken on a tour of Du Pont laboratories and the Hagley Museum located on the site of the first Du Pont powder mills erected some 160 years ago. Both groups also met with Du Pont President Crawford H. Greenewalt. The FFA visitors were: Jim Thomas, president, Patterson, Ga.; Kenney Earl Gray, secretary, Dorsey, Miss.; L. G. "Jack" Crews, Pacific vice president, Cheyenne, Wyo.; Joe H. Hughes, Jr., Southern vice president, Duncan, S. C.; Richard Poor, Central vice president, Neosho, Mo.; Dean Hoffer, North Atlantic vice president, Manheim, Pa. Carl Vincent, president of the Delaware FFA and Rodney Caulk, Star Regional American farmer 1959, were also present.

The 4-H boys and girls are: Bowen Akers, 18, of Greencastle, Ind., a Purdue University freshman; Janet Long, 18, of Milford, Mich., freshman at Michigan State University; Janet Lea Cavender, 20, of Charleston, W. Va., student at Morris Harvey College, Charleston; Thomas Richard Juhl, 18, of Lakewood, Colo., a Colorado University freshman; Lemuel Stephen Parks, 18, of Normandy, Tenn.; and Rebecca Anne Parker of Benson, N. C., a freshman at East Carolina College.

PAINTING GUIDES AVAILABLE

A *Home Painting and Color Guide* published by Du Pont is available from paint dealers throughout the country. It provides painting and decorating ideas for every part of the home. For the farm homeowner who plans to do part or all the work himself, there is a section of easy-to-follow instructions for all types of painting—walls and ceilings, exteriors, basements and garages, floors and metal surfaces, and refinishing furniture. The guide is also obtainable from the Company for a handling charge of 15 cents. Address requests to: Editor, *Agricultural News Letter,* Du Pont Company, Wilmington 98, Del.

Another new booklet explains the proper use of new rust-inhibiting finishes. These finishes are primary primers which neutralize the action of rust and corrosion and provide a perfect surface for subsequent coats of paint. The booklet, which points out that know-how in painting metal can eliminate fears of rust and corrosion, gives complete instructions for protecting all kinds of metal, indoors and out. *How to Stop Rust with "Duco" Metal Finishes* is available without charge from: Editor, *Agricultural News Letter,* Du Pont Company, Wilmington 98, Del.

Farmers Ask About . . . .

Q: How does the green stink bug injure plants?
A: **Nezara viridula (L.) lowers the vitality of plants by sucking the sap from foliar parts. It also feeds on fruit, making it frequently unsalable.**

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Q: What proportion of citrus fruit is used fresh?
A: **Less than half the crop, according to USDA.**

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Q: Does the season during which cows freshen affect milk production?
A: **An Arkansas study found that cows freshening in spring reached higher milk production than those freshening in other seasons.**

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Q: Does cutting off of tassels really improve corn production and drying rate?
A: **No. A Delaware study shows no improvement in drying rate, lodging, yields, losses, or shelling percentage.**

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Q: Is the social security tax increase of January 1, 1960, the last increase?
A: **It is not. Already on the law books are increases for 1963, 1966, and 1969. Within nine years, the tax will rise 50 per cent.**

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Q: How big a job is the research needed to develop new weed killers?
A: **Up to 2,000 compounds must be tested, and the cost may range as high as $4 million.**

* * * * *

Q: What is the value of crops lost to agricultural pests each year?
A: **The Secretary of Agriculture estimated the loss is $3 billion from plant diseases, $4 billion from weeds, and another $1 to $2 billion from rodents — a total of more than $8 billion.**

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Q: Did Du Pont make record profits in 1959?
A: **No. Although net operational income was substantially higher than in 1958, the all-time high of 1957 was not reached — even though the Company's operating investment was up 13 per cent.**

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Q: How much of an investment does industry have for each employee?
A: **About $15,300. Du Pont's investment is $32,500 per employee.**

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Q: Is any farm animal immune to the face fly?
A: **The only major animal on which the pest has not been observed is the pig.**

Q: Do ruminants need individual amino acids in their rations?
A: **Recent research by Purdue and others indicates that ruminant rations supplemented with lysine and perhaps methionine result in improved performance, indicating that the widely-accepted idea that ruminants manufacture their entire amino acid requirement could be incorrect.**

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Q: What chemical will protect young trees against rabbits?
A: **"Arasan" 42-S thiram seed disinfectant painted on tree trunks will protect against rabbits and certain mice and against deer browsing. This will also protect most plants and shrubs against animal depredation.**

* * * * *

Q: What chemical will protect potato seed pieces against *Fusarium?*
A: **Du Pont's "Semesan Bel" is broadly effective in treatment of potato diseases, including Fusarium, Rhizoctonia, Verticulum Wilt, and others.**

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Q: How extensive is insect damage to stored peanuts?
A: **A USDA study in Georgia found that damage was confined to loose shelled kernels and kernels in cracked pods during a normal storage season.**

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Q: What is the relation of temperature to soybean emergence?
A: **At soil temperature under 65°, emergence usually requires 12 to 14 days, but only five to seven days above 65°.**

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Q: Does storage method affect cooking quality of rice?
A: **Yes, an Arkansas study found better quality in rice stored in a dry storeroom than in a refrigerator.**

* * * * *

Q: Is the family farm really disappearing?
A: **Although average farm size is rising, a USDA report shows there has been no substantial increase in concentration of ownership since World War II. Individuals still own 96 per cent of the cropland, with 49 per cent farm and ranch lands owned by husband and wife combinations.**

* * * * *

Q: What is the total population that can be supported by products of the world's soil?
A. **A British expert estimates that six billion could be supported within the next century, but production costs would be much higher.**

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